

Serial No. 10/699,460
September 29, 2005
Reply to the Office Action dated May 4, 2005 and
the Personal Interview conducted September 13, 2005
Page 5 of 13

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

Claims 1-32 (canceled).

Claim 33 (currently amended): A method for manufacturing a semiconductor film, comprising the steps of:

- (a) forming an amorphous semiconductor layer on an insulative surface;
- (b) adding a catalyst element capable of promoting crystallization to the amorphous semiconductor layer and then performing a first heat treatment so as to crystallize the amorphous semiconductor layer, thereby obtaining a crystalline semiconductor layer;
- (c) performing a first gettering process to remove ~~a first group of semiconductor compounds of the catalyst element~~ from the semiconductor layer; and
- (d) performing a second gettering process that is different from the first gettering process to remove ~~a second group of semiconductor compounds of the catalyst element~~ from the semiconductor layer; wherein
the first and second groups of semiconductor compounds of the catalyst element are different from each other, the first and second gettering processes getter different semiconductor compounds of the catalyst element; and
at least one the first and second gettering processes getters the catalyst element that is not part of a semiconductor compound.

Claim 34 (original): The method for manufacturing a semiconductor film according to claim 33, wherein the step (c) includes removing at least large masses of a

Serial No. 10/699,460
September 29, 2005
Reply to the Office Action dated May 4, 2005 and
the Personal Interview conducted September 13, 2005
Page 6 of 13

semiconductor compound of the catalyst element present in the crystalline semiconductor layer.

Claim 35 (original): The method for manufacturing a semiconductor film according to claim 33, wherein the step (d) includes moving at least a part of the catalyst element remaining in the crystalline semiconductor layer so as to form a low-catalyst-concentration region in the crystalline semiconductor layer, the low-catalyst-concentration region having a lower catalyst element concentration than in other regions.

Claim 36 (original): The method for manufacturing a semiconductor film according to claim 33, wherein the step (c) includes a step of removing a higher semiconductor compound of the catalyst element, and the low-catalyst-concentration region includes substantially no higher semiconductor compound.

Claim 37 (currently amended): The method for manufacturing a semiconductor film according to claim 36, wherein the crystalline semiconductor layer is substantially made of Si, the catalyst element is a metal element M, and the higher semiconductor compound has a composition of M_xSi_y ($x > y$) ($x < y$).

Claim 38 (original): The method for manufacturing a semiconductor film according to claim 33, wherein the step (d) includes a step of moving the catalyst element forming a lower semiconductor compound of the catalyst element, and the low-catalyst-concentration region includes substantially no lower semiconductor compound.

Claim 39 (currently amended): The method for manufacturing a semiconductor film according to claim 38, wherein the crystalline semiconductor layer is substantially made of Si, the catalyst element is a metal element M, and the lower semiconductor compound has a composition of M_xSi_y ($x \leq y$) ($x \geq y$).

Serial No. 10/699,460
September 29, 2005
Reply to the Office Action dated May 4, 2005 and
the Personal Interview conducted September 13, 2005
Page 7 of 13

Claim 40 (original): The method for manufacturing a semiconductor film according to claim 33, wherein the step (d) includes a step of moving the catalyst element present in a form of solid solution in the crystalline semiconductor layer.

Claim 41 (original): The method for manufacturing a semiconductor film according to claim 33, wherein the step (c) includes a step of selectively etching away a semiconductor compound of the catalyst element.

Claim 42 (original): The method for manufacturing a semiconductor film according to claim 41, wherein the etching process in the step (c) is performed by using acid including at least hydrogen fluoride as an etchant.

Claim 43 (original): The method for manufacturing a semiconductor film according to claim 33, wherein the step (d) includes a step of dissolving, in the crystalline semiconductor film, the catalyst element forming a semiconductor compound of the catalyst element remaining in the crystalline semiconductor film.

Claim 44 (previously presented): The method for manufacturing a semiconductor film according to claim 33, wherein the step (d) includes a step of forming a gettering region or a gettering layer capable of attracting the catalyst element, and a step of performing a second heat treatment so that the catalyst element remaining in the crystalline semiconductor film is moved into the gettering region or the gettering layer.

Claim 45 (original): The method for manufacturing a semiconductor film according to claim 44, wherein the gettering region or the gettering layer has a larger amorphous component content than in other regions of the crystalline semiconductor film.

Serial No. 10/699,460

September 29, 2005

Reply to the Office Action dated May 4, 2005 and
the Personal Interview conducted September 13, 2005

Page 8 of 13

Claim 46 (original): The method for manufacturing a semiconductor film according to claim 44, wherein the gettering region or the gettering layer includes a group VB impurity element giving n-type conductivity.

Claim 47 (original): The method for manufacturing a semiconductor film according to claim 46, wherein the impurity element includes at least one element selected from the group consisting of P, As and Sb.

Claim 48 (original): The method for manufacturing a semiconductor film according to claim 44, wherein the gettering region or the gettering layer includes a group IIIB impurity element giving p-type conductivity.

Claim 49 (original): The method for manufacturing a semiconductor film according to claim 48, wherein the impurity element includes at least one of B and Al.

Claim 50 (original): The method for manufacturing a semiconductor film according to claim 44, wherein the gettering region or the gettering layer includes at least one rare gas element selected from the group consisting of Ar, Kr and Xe.

Claim 51 (previously presented): The method for manufacturing a semiconductor film according to claim 44, wherein at least one of an impurity element and at least one rare gas element included in the gettering region or the gettering layer are introduced by an ion implantation method.

Claim 52 (original): The method for manufacturing a semiconductor film according to claim 44, further comprising a step of removing the gettering region or the gettering layer after the step (d).

Serial No. 10/699,460

September 29, 2005

Reply to the Office Action dated May 4, 2005 and

the Personal Interview conducted September 13, 2005

Page 9 of 13

Claim 53 (original): The method for manufacturing a semiconductor film according to claim 33, wherein the step (b) includes a step of selectively adding the catalyst element to a region of the amorphous semiconductor film and then performing the first heat treatment so that a crystal growth process proceeds laterally from the region to which the catalyst element has been selectively added.

Claim 54 (original): The method for manufacturing a semiconductor film according to claim 33, wherein the step (b) includes a step of irradiating the crystalline semiconductor film with laser light after the first heat treatment.

Claim 55 (original): The method for manufacturing a semiconductor film according to claim 54, wherein:

the step (c) includes a step of selectively etching away a semiconductor compound of the catalyst element; and

the etching step is performed after the first heat treatment step and before the laser light irradiation step in the step (b), and serves also as a surface cleaning step.

Claim 56 (original): The method for manufacturing a semiconductor film according to claim 33, wherein:

the step (b) includes a step of forming an insulating film on the crystalline semiconductor film after the first heat treatment step;

the step (c) includes a step of selectively etching away a semiconductor compound of the catalyst element; and

the etching step is performed after the first heat treatment step and before the insulating film formation step in the step (b), and serves also as a surface cleaning step.

Claim 57 (original): The method for manufacturing a semiconductor film according to claim 33, wherein the catalyst element is at least one metal element selected from the group consisting of Ni, Co, Sn, Pb, Pd, Fe and Cu.

Serial No. 10/699,460
September 29, 2005
Reply to the Office Action dated May 4, 2005 and
the Personal Interview conducted September 13, 2005
Page 10 of 13

Claim 58 (original): A method for manufacturing a semiconductor device, comprising the steps of:

providing a semiconductor film manufactured by the method for manufacturing a semiconductor film according to claim 33;

and producing a thin film transistor including the semiconductor film in an active region thereof.

Claim 59 (original): The method for manufacturing a semiconductor device according to claim 58, wherein:

the active region includes a channel region, a source region and a drain region; and

the step of producing the thin film transistor includes a step of forming at least the channel region in the low-catalyst-concentration region.

Claim 60 (original): The method for manufacturing a semiconductor device according to claim 59, wherein the step of producing the thin film transistor includes a step of forming the channel region, the source region and the drain region in the low-catalyst-concentration region.

Claims 61-68 (canceled).